

DETAILED ACTION

Status of Claims

1. No claim amendments are made in view of applicant's response filed 1 December 2011. Therefore, claim 17 are currently under examination.

Status of Previous Rejections

2. After careful reconsideration and extended discussion with other examiners in the art of electrolysis, the examiner has agreed that it would be more appropriate to treat the claimed slow releasing halogen dioxide salt tablet with dissolution control agent as part of the claimed apparatus and give patentable weight during examination since the specifics of the slow releasing halogen dioxide salt tablet is positively recited in the body of the claim.

As a result, the rejection of claim 17 under 35 U.S.C. 103(a) as being unpatentable over Buckley et al. US 6,632,347 B1(Buckley) in view of Kaczur et al. US 5,106,465 (Kaczur), and further in view of Capuano et al. US 4,542,008(Capurano) has been withdrawn.

In addition, the rejection of claim 17 under 35 U.S.C. 103(a) as being unpatentable over Kelley US 6,306,281 B1(Kelley) in view of Capuano, and further in view of Buckley, and further in view of Kaczur has been withdrawn.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

Art Unit: 1733

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buckley et al. US 6,632,347 B1(Buckley) in view of Kaczur et al. US 5,106,465 (Kaczur), and further in view of Capuano et al. US 4,542,008(Capurano), and further in view of Hei et al. US 6,663,902 B1(Hei).

Buckley teaches an electrochemical apparatus comprising a concentrated salt solution tank(i.e. reservoir) that supplies concentrated salt solution to process water stream to locally form the electrolyte feed solution to the electrolyzer(Fig. 2 #20, col. 19 line 64 - col. 20 line 49). Buckley further teaches using a peristaltic pump for pumping the concentrated salt solution to the process water stream forming feed stream to the electrolyzer(col. 20 lines 41-45, Fig. 2). Buckley's electrolyzer comprise an anode, a cathode, a porous ceramic semi-permeable separator(i.e. non-conducting porous flow barrier) separating the anode and the cathode, an inlet for receiving the feed solution and an outlet for discharging effluent(col. 14 lines 34-41). The electrolyzer of Buckley further comprises a passage of feed solution adjacent to the anode and an electric current supply providing current to the electrolysis cell.

Regarding claim 17, Buckley teaches that is porous ceramic semi-permeable separator can be used as an alternative to an ion-selective membrane(col. 14 lines 34-65). Therefore, the examiner concludes that Buckley's is porous ceramic semi-permeable separator is not ion-selective membrane and an embodiment of Buckley's teaching is a non-membrane electrolysis cell as claimed(i.e. an electrolysis cell without an ion-selective membrane). The porous ceramic semi-permeable separator as taught

Art Unit: 1733

by Buckley reads on the claimed non-conducting porous flow barrier. Buckley further teaches that its anode is a titanium anode(col. 14 lines 25-27).

In addition, the claimed halogen dioxide feed solution and the halogen dioxide salt are directed to material being worked on by the claimed apparatus, therefore, do not render the instant apparatus claims patentable. See MPEP 2115.

However, Buckley does not explicitly teach that the metal anode is porous. Buckley also does not explicitly teach the claimed passing of at least a portion of the feed solution through a salt chamber comprising a slow dissolving salt tablet to provide controlled release of the salt.

Kaczur also teaches an electrolytic cell for the generation of chlorine dioxide (abstract). Kaczur further teaches the use of a porous platinum coated titanium anode(col. 4 lines 41-63).

Regarding claim 17, it would have been obvious to one of ordinary skill in the art to have incorporated the porous platinum coated titanium anode of Kaczur into the electrolytic apparatus of Buckley in order to utilize the high surface contact area due to the porosity of the anode and achieve high corrosion resistance as taught by Kaczur (col. 4 lines 44-45 and 57-60).

The porous anode of Buckley in view of Kaczur comprises a plurality of porous flow passages through which at least a portion of the aqueous feed solution flows. In addition, since the direction of electricity in the electrolysis cell of Buckley travels horizontally between the anode and the cathode chamber(Fig. 2 #62,64), the inlet to the electrolysis cell locates at the bottom of the electrolysis cell and the outlet locates at the

Art Unit: 1733

top of the electrolysis cell, the examiner concludes that the electrolyte electrolysis cell of Buckley in view of Kaczur flows in a cross direction to the flow of electricity between the anode and cathode chambers as claimed. Buckley further teaches claimed return passage for recycling of feed as claimed (Fig. 2 # 126, col. 24 lines 4-10).

Capuano teaches an electrochemical chlorine dioxide generation process wherein the chlorine dioxide containing process solution can be resaturated by passing through a resaturator containing chlorine dioxide salt such as NaClO_2 in the form of tablets(col. 5 lines 55-68). Capuano further teaches that such a resaturation system allows the production of resaturated solution having accurately controlled chlorite concentration(col. 5 lines 62-67).

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the solution resaturation system including the chlorine dioxide salt in the form of tablets as taught by Capuano into the feeding system in the electrolysis cell of Buckley in view of Kaczur in order to achieve accurate control of chlorite concentration as taught by Capuano.

Additionally, the claimed halogen dioxide salt concentration in the feed solution is directed to a process limitation while the instant claim is directed to an apparatus, therefore, does not render the instant claim patentable. As stated in MPEP 2114 [R-1], it is well settled that the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus as long as the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

However, Buckley in view of Kaczur and Capuano do not explicitly teach the claimed dissolution control agent for controlled release of chlorine dioxide.

Hei teaches sustained release agents such as waxes can be used in a chlorine dioxide generation process in order to regulate the rate of release of chlorine dioxide (col. 11 lines 17-33).

Therefore, it would have been obvious to have incorporated sustained release agents such as waxes as taught by Hei into the chlorine dioxide tablet in the apparatus of Buckley in view of Kaczur and Capuano in order to regulate the release rate of chlorine dioxide as taught by Hei.

5. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kelley US 6,306,281 B1(Kelley) in view of Capuano, and further in view of Buckley, and further in view of Kaczur, and further in view of Hei.

Kelley teaches an electrolytic apparatus for the generation of chlorine dioxide(abstract). The apparatus comprises an aqueous sodium chlorite feed solution(col. 2 lines 55-61), a non-membrane electrolysis cell comprising an anode, a cathode, an inlet, an outlet(Fig. 1) and a power source connected to the anode and the cathode(col. 3 lines 18-21), thereby providing current through the aqueous feed solution.

Regarding claim 17, the inlet and the gap between the anode and the cathode of Kelley reads on the claimed passage for the feed solution adjacent to the anode. The inlet in the electrolytic apparatus of Kelley is capable of receiving aqueous feed solution

stream and the outlet in the apparatus of Kelly is capable of discharging halogen dioxide containing effluent as claimed.

In addition, the claimed halogen dioxide feed solution is directed to a material that is worked on by the instantly claimed apparatus. As stated in MPEP 2115, it is well settled that "[i]nclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims." *In re Young*, 75 F.2d 996, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)).

However, Kelley does not explicitly teach that the claimed means for delivering halogen dioxide salt directed to an aqueous feed solution inlet stream to locally form the aqueous halogen dioxide feed solution or that such means comprises a halogen dioxide salt chamber comprising a slow dissolving tablet of halogen dioxide salt to provide controlled release of the salt by passing at least a portion of the feed solution through the salt chamber.

Capuano teaches an electrochemical chlorine dioxide generation process wherein the chlorine dioxide containing process solution can be resaturated by passing through a resaturator containing chlorine dioxide salt such as NaClO_2 in the form of tablets(col. 5 lines 55-68). Capuano further teaches that such a resaturation system allows the production of resaturated solution having accurately controlled chlorite concentration(col. 5 lines 62-67).

It would have been obvious to one of ordinary skill in the art to have incorporated the solution resaturation system including the chlorine dioxide salt in the form of tablets

Art Unit: 1733

as taught by Capuano into the feeding system in the electrolysis cell of Kelley in order to achieve accurate control of chlorite concentration as taught by Capuano.

Therefore, the apparatus of Kelley in view of Capuano comprises the claimed means for delivering halogen dioxide salt directly into an aqueous feed solution inlet stream to locally form the aqueous feed solution as claimed. In addition, since the apparatus of Kelley in view of Capuano is structurally the same as the claimed halogen dioxide generating system, one of ordinary skill in the art would have found it obvious that the apparatus of Kelley in view of Capuano is capable of consume power at about one Watt or less as claimed.

However, Kelley in view of Capuano do not explicitly teach the claimed non-conducting porous flow barrier.

The teachings of Buckley are discussed in paragraph 4 above.

Buckley further teaches that a semi-permeable porous ceramic separator (i.e. non-conducting porous flow barrier) is placed between the anode and cathode of the electrolysis cell in order to achieve an adequate flow of solution between the anode and the cathode chambers to provide acceptable electrical resistance while being sufficiently non-permeable to prevent gross mixing of anolyte and catholyte (col. 24 lines 44-65). Buckley further teaches the claimed return passage for returning the depleted effluent back to the source(Fig. 2 # 126).

Regarding claim 17, it would have been obvious to one of ordinary skill in the art to have incorporated the porous ceramic separator (i.e. non-conducting porous flow barrier) as taught by Buckley into the electrolytic cell of Kelley in view of Capuano in

Art Unit: 1733

order to achieve an adequate flow of solution between the anode and the cathode chambers to provide acceptable electrical resistance while being sufficiently non-permeable to prevent gross mixing of anolyte and catholyte as taught by Buckley. In addition, one of ordinary skill in the art would also have found it obvious to incorporate the return passage for depleted effluent back to feed stream as taught by Buckley into the apparatus of Kelley in view of Capuano in order to reduce operating cost and increase efficiency by recycling electrolyte.

Therefore, the porous ceramic separator in the apparatus of Kelley in view of Capuano and Buckley reads on the claimed non-conducting porous flow barrier. In addition, the apparatus of Kelley in view of Capuano and Buckley comprises the claimed passage.

However, Kelley in view of Capuano and Buckley do not explicitly teach that the metal anode is porous.

Kaczur also teaches an electrolytic cell for the generation of chlorine dioxide (abstract). Kaczur further teaches the use of a porous platinum coated titanium anode(col. 4 lines 41-63).

Regarding claim 17, it would have been obvious to one of ordinary skill in the art to have incorporated the porous platinum coated titanium anode of Kaczur into the electrolytic apparatus of Kelley in view of Capuano and Buckley in order to utilize the high surface contact area due to the porosity of the anode and achieve high corrosion resistance as taught by Kaczur (col. 4 lines 44-45 and 57-60).

In addition, the porous anode of Kelly in view of Capuano, Buckley and Kaczur is capable of allow at least a portion of the aqueous feed solution flows in a cross direction to a flow of electricity between the anode and the cathode as claimed. Furthermore, the porous ceramic separator as taught by Kelly in view of Capuano, Buckley and Kaczur is non-conductive and is capable of restricting flow of the electrolyte solution in a cross direction to the flow of electricity between the anode and the cathode as claimed.

Furthermore, the claimed halogen dioxide salt concentration in the feed solution is directed to a process limitation while the instant claim is directed to an apparatus, therefore, does not render the instant claim patentable. As stated in MPEP 2114 [R-1], it is well settled that the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus as long as the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

However, Kelley in view of Capuano, Buckley and Kaczur do not explicitly teach the claimed dissolution control agent.

Hei teaches sustained release agents such as waxes can be used in a chlorine dioxide generation process in order to regulate the rate of release of chlorine dioxide (col. 11 lines 17-33).

Therefore, it would have been obvious to have incorporated sustained release agents such as waxes as taught by Hei into the chlorine dioxide tablet in the apparatus of Kelley in view of Capuano, Buckley and Kaczur in order to regulate the release rate of chlorine dioxide as taught by Hei.

Response to Arguments

6. Applicant's arguments filed 1 December 2011 have been fully considered but they are not persuasive.

In the remarks, applicant's arguments regarding rejections I and II are moot in view of withdraw of these rejections.

Applicant additionally argues that rejection III of the previous Non-Final Office Action was based on piecemeal reconstruction.

The examiner does not find applicant's arguments convincing because the combination of the prior art references are originated based on proper motivations provided from these prior art references. See paragraphs 4-5 above. In addition, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicant further argues that Hei is not analogous art since it is not related to an electrolysis cell.

The examiner does not find applicant's argument convincing because Hei is incorporated to the rejection grounds to show that the use of dissolution control agent such as waxes to control release rate of chloride dioxide is well known. Since the use of slow releasing chlorine dioxide salt tablets as claimed has been implemented in

Art Unit: 1733

variety of different applications and is not limited to electrolysis only, one of ordinary skill in the art of electrolytical treatment of brine using chlorine dioxide salt tablets would have considered all chlorine dioxide salt tablets including those used in other types of applications. Therefore, the examiner maintains that the application of Hei to the rejection grounds is proper.

Applicant further argues that rejection IV uses five separate references, which is excessive for establishing prima facie case of obviousness.

The examiner does not find applicant's argument convincing because reliance on a large number of references in a rejection does not, without more, weigh against the obviousness of the claimed invention. See *In re Gorman*, 933 F.2d 982, 18 USPQ2d 1885 (Fed. Cir. 1991).

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Art Unit: 1733

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LOIS ZHENG whose telephone number is (571)272-1248. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lois Zheng/
Patent Examiner
AU1733